APPLICATION UNDER UNITED STATES PATENT LAWS

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Invention:	A SYSTEM FOR MANUFACTURING TOBACCO PRODCUTS AND A PROCEDURE FOR TRANSFERRING HEAT BETWEEN TWO OR MORE STATIONS OF SUCH A SYSTEM
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This is a:

- ☐ Provisional Application
- ☒ Regular Utility Application
- ☐ Continuing Application
  ☐ The contents of the parent are incorporated by reference
- ☐ PCT National Phase Application
- ☐ Design Application
- ☐ Reissue Application
- ☐ Plant Application

This application claims priority to Italian Patent Application No. BO 2003 A 000164, filed March 25, 2003 which is incorporated by reference herein.

SPECIFICATION

A SYSTEM FOR MANUFACTURING TOBACCO PRODUCTS AND A PROCEDURE FOR TRANSFERRING HEAT BETWEEN TWO OR MORE STATIONS OF SUCH A SYSTEM

BACKGROUND OF THE INVENTION

The present invention relates to a system for manufacturing tobacco products as described in the prior art section of claim 1.

In addition, the invention relates to a procedure for transferring heat between two or more stations of a system for manufacturing tobacco products, as described in the prior art section of claim 13.

The term "station" is utilized in the course of the specification to describe a group of machines by which cigarettes are made and packed, also a group of machines and devices by which tobacco is processed.

The invention relates to the art field of tobacco products and in particular to the manufacture of cigarettes, also of cigarette packets and cartons and/or related products.

Conventionally, the manufacture of cigarettes and other such tobacco products involves the use of

various different machines operating in conjunction one with another in such a way that a raw material, typically leaf tobacco cured and compressed to form bulk units of convenient size for storage purposes, can be transformed into a succession of tobacco products such as cigarettes and the like, wrapped in packets and cartons for subsequent distribution and sale.

Generally speaking, systems of conventional type for manufacturing and packaging tobacco products comprise two processing stations needed in order to bring about the aforementioned transformation of raw forming material into tobacco products. A first station, or primary processing station, generally comprises machinery and/or devices needed in order to convert the raw forming material into a treated forming material suitable for used in the steps of assembling and shaping the aforementioned tobacco products. A second or cigarette making and packing station, which performs the manufacturing steps proper, is equipped with machinery and/or devices operating directly on the treated forming material supplied by the primary processing station, first fashioning the tobacco products with the selfsame material and then wrapping the products in packets.

The raw forming material undergoes one or more

treatments in the primary processing station that depend on a constant input of heat and moisture. This heating and humidifying process, referred to also as conditioning, consists in maintaining the environment around the primary processing station, or in practice the building enclosure in which the station is installed, at a predetermined constant temperature suitable for the primary treatments being carried out.

Normally, the temperature level in the primary processing station is maintained by one or more specially designed heating devices installed in the selfsame station.

Conversely, the manufacturing station houses a notable quantity of machinery and/or devices with numerous moving parts, as well as parts liable to overheat, which means that the station itself heats up considerably during manufacture, and this can jeopardize the quality of the products in process. Consequently, the manufacturing station will as a rule be air-conditioned to ensure a suitable mean temperature.

In order to cool the machines and/or devices subject to overheating, the manufacturing station is also equipped with a suitable closed-circuit cooling system. More exactly, the cooling system comprises a

chiller unit connected to a fluodynamic circuit extending around the manufacturing station, of which the various branches are incorporated together with suitable heat-exchange devices into the respective machines and/or devices that require cooling. Thus, a liquid cooled by the chiller unit and circulating in the fluodynamic circuit is used to lower the temperature of the machinery and/or devices in operation, whilst the temperature of the liquid is raised as a result of the heat exchange. The liquid is returned to the chiller unit, cooled, and recirculated to continue cooling the machines and/or devices in such a way that these are kept at a temperature no higher than a prescribed limit.

It has been found that conventional systems in widespread use for manufacturing tobacco products, while able to meet the typical needs of cigarette manufacturers in terms of output, are nonetheless not without certain drawbacks concerned mainly with the high energy consumption that accompanies the use of cooling systems serving the manufacturing station, and heating systems serving the primary processing station where the raw forming material is prepared, also the costs of making the tobacco products and by extension the cost of marketing, attributable both to the aforementioned energy consumption and to the high

maintenance expenditure generated by the heating and cooling systems.

The object of the present invention is therefore to overcome the problems associated with the prior art by setting forth a system for manufacturing tobacco products and a procedure for transferring heat between two or more stations of such a system, such as will achieve a considerable reduction in energy consumption and significantly cut the costs of producing and marketing the tobacco products in question.

SUMMARY OF THE INVENTION

The stated object is realized according to the present invention in a system for manufacturing tobacco products that comprises a manufacturing station supplied with a treated forming material, in which the tobacco products are made and packed, and a heat exchange device associated with the manufacturing station in such a way as to cool the selfsame station by means of a heat exchange fluid caused to circulate within a fluodynamic circuit associated with the making and packing machinery. The fluodynamic circuit of the heat exchange device is an open circuit that comprises a feed pipeline connected to an external source from which the heat exchange

fluid is supplied, a discharge pipeline connecting on one hand with the feed pipeline and connectable also to a discharge station into which the heat exchange fluid is released ultimately from the circuit, also a first heat exchange pipeline connected to the feed pipeline and to the discharge pipeline and extending at least in part through the manufacturing station.

The stated object is realized, likewise according to the invention, in a procedure for transferring heat between two or more stations of a system for manufacturing tobacco products, including the steps of cooling a manufacturing station by circulating a heat exchange fluid procured from a source located externally of the station, and then utilizing the heat recovered from the cooling step to maintain a prescribed conditioning temperature in a station for the primary processing of at least one raw forming material used in manufacture.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described in detail, by way of example, with the aid of the accompanying drawings, in which:

-figure 1 illustrates a system for the manufacture of tobacco products, represented schematically and in perspective;

-figure 2 provides a schematic representation of a fluodynamic circuit forming part of a heat exchange device associated with the system of figure 1;

-figure 3 is a further schematic representation of the system as in figure 1, shown in an alternative embodiment.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the accompanying drawings, 1 denotes a system for the manufacture of tobacco products, such as cigarettes, cigars and the like, comprising at least one primary processing station 2 in which at least one raw forming material (not indicated), namely cured tobacco compacted previously into bulk units of substantially parallelepiped appearance, undergoes one or more conditioning treatments such as will render it suitable for use in manufacturing the aforementioned tobacco products.

More exactly, the primary processing station 2 comprises items of machinery and/or devices (not illustrated, being conventional in embodiment) by which the bulk units of raw forming material are broken up into a plurality of small portions; these smaller pieces are then conveyed to a conditioning area where the raw material is exposed to steady conditions of heat and humidity, and moistened thus

to the point of assuming the characteristics that will render it suitable as a filler material for the tobacco products. Given therefore that the primary processing station 2 is an environment in which temperature and humidity are closely linked to constant and predetermined values, calculated so that changes will be induced in the raw material according to prescribed parameters, the physical conditions in the environment must be such as to assure the quality of the treated forming material destined to undergo successive manufacturing steps. To this end, the primary processing station is set up internally of a special structure 2a, isolated hermetically from the external environment, so as to create an enclosure inside which the operation of maintaining the physical conditions needed for preparation of the raw forming material is favored by the creation of the hermetic barrier.

Still with reference to figure 1, the system 1 comprises at least one manufacturing station 3 incorporating machines and/or devices 4 by which treated material prepared in the primary processing station 2 is processed further. More particularly, the machines and/or devices 4 of the manufacturing station 3 are designed to transform the treated material into a plurality of tobacco products, such

as cigarettes.

As illustrated in figure 3, the system 1 could include two or more stations 3, equipped with respective cigarette making and packing lines by which treated forming material received from the primary processing station 2 is transformed into a plurality of tobacco products.

Each manufacturing station 3 preferably comprises a building or shop 3a isolated from the surrounding environment and housing, by way of example, albeit implying no limitation, a cigarette maker 5 and a filter tip attachment 6, also a cigarette packer 7 connected to the filter tip attachment 6 by way of a temporary storage unit or buffer 8, turning out packets 9 of cigarettes. The packer 7 can also be connected to a cellophaner 10 by which overwrapped packets 11 are directed toward a cartoner 13, from where cartons 13 are conveyed to a case filler or parceller 14 and put into cases 15 at the outfeed stage of the manufacturing station 3. The machines and/or devices 4 of the manufacturing station 3 are interconnected along a predetermined production line P by means of conveyor devices denoted 16 and 17, of which the conveyor 16 linking the filter tip attachment 6 and the packer 7, and the conveyor 17 linking the packer 7 and the cellophaner 10, in

particular, are indicated in figure 1.

In addition, each machine or device 4 operates utilizing respective wrapping materials fed from rolls and/or stacks, consisting of paper, metal foil, cellophane, diecut cardboard blanks and other such packaging media, all of which denoted 18, as well as additional or auxiliary materials, namely coupons and revenue stamps (not illustrated).

Given the sizeable presence of machinery and/or devices 4 with significant numbers of moving parts and/or components tending to overheat, for example mechanical elements set in motion and operating in conditions of appreciable friction, or electrical and/or electromechanical components operating with high levels of current flowing through the relative circuits, the temperature rises markedly within the manufacturing station and this can adversely affect the physical and chemical properties of the treated forming material being processed. Moreover, it has been found that in certain of the areas liable to overheat, the resulting risk of degradation to the treated material increases markedly, jeopardizing the entire manufacturing process.

Advantageously, to the end of cooling the various parts and/or elements of the machines or devices 4 subject to overheating, the system 1 comprises at

least one heat exchange device 19 associated with the manufacturing station 3 and serving to cool the aforementioned parts and elements with the aid of a heat exchange fluid (not illustrated) circulated through a suitable fluodynamic circuit 20 extending at least partly around the station 3.

As discernible from the drawings, the fluodynamic circuit 20 will be embodied preferably as an open circuit equipped with suitable driving and pumping means 20a able to ensure a continuous circulation of the heat exchange fluid through the fluodynamic circuit, following a predetermined flow path A.

In detail, the fluodynamic circuit 20 comprises at least one feed pipeline 21 connectable to a source 22 of heat exchange fluid located externally of the primary processing station 2, where the raw forming material is conditioned, and the station 3 in which the tobacco products are made and packed. The fluodynamic circuit 20 further comprises a first heat exchange pipeline 23 connected to the end of the feed pipeline 21 opposite from the end connected to the source 22 of fluid, and extending at least partly around the manufacturing station 3. The circuit 20 also includes at least one discharge pipeline 24 connecting on the one hand with the feed pipeline 21 by way of the first heat exchange pipeline 23 and

connectable on the other hand to a discharge station 25 positioned preferably, as in the case of the fluid source 22, externally of the primary processing station 2 and the manufacturing station 3 of the system 1.

More exactly, the first heat exchange pipeline 23 of the fluodynamic circuit 20 comprises at least one branch 26 engaging a heat-generating machine and/or device 4 of the manufacturing station 3 in such a way that the item of equipment in question is cooled by the heat exchange fluid circulated from the source 22.

In the example of the accompanying drawings, the first heat exchange pipeline 23 comprises a main flow line 27 routed internally of the manufacturing station 3 and representing a continuation of the feed pipeline 21. The main flow line 27 presents a plurality of branches 26, each designed to engage a respective heat-generating machine or other type of device 4 installed in the manufacturing station 3. The first heat exchange pipeline 23 also includes a secondary flow line 28 connecting the plurality of branches 26 to the aforementioned discharge line 24 of the fluodynamic circuit 20, so that the fluid from the source 22 passes first into the main flow line 27, occupying the branches 26 as a result, then

through the secondary line 28 and ultimately out toward the discharge line 24. In effect, the secondary flow line 28 of the first heat exchange pipeline 23 is connected to the ends of the single branches 26 opposite to the ends connected to the main flow line 27, thus combining with this same line and with the branches to establish a cooling network 29 deployed internally of the manufacturing station 3.

As discernible from the accompanying drawings, each single branch 26 of the first heat exchange pipeline 23 is equipped preferably with at least one heat exchanger 26a applicable to the portion or element of a relative machine or device 4 liable to overheat. Naturally enough, the heat exchangers 26a will be conceived and designed so as to favor the most effective heat exchange possible between the hot part and the coolant fluid; consequently, these same parts of the machines or devices 4 are cooled by the fluid as it flows through the branches 26, whilst the fluid in turn picks up heat during its passage through the circuit 20.

In order to exploit the heat accumulated by the coolant fluid leaving the manufacturing station 3, the fluodynamic circuit 20 of the heat exchange device 19 also comprises a second heat exchange

pipeline 30 extending at least partly through the primary processing station 2 where the raw forming material is conditioned.

More exactly, the second heat exchange pipeline 30 extends from the secondary flow line 28 of the first heat exchange pipeline 23 to the discharge pipeline 24, so that liquid heated by and leaving the manufacturing station 3 can be utilized to heat the primary processing station 2. Advantageously, the second heat exchange pipeline 30 might also be equipped, similarly to the first, with one or more heat exchangers 30a designed especially to maintain an optimum temperature for the treatments carried out in the primary station 2

In a preferred embodiment, the source 22 and the discharge station 25 will be artificial and, as illustrated in the accompanying drawings, separate from one another. The elements in question might connect respectively, for example, with the water supply main serving the manufacturing station 3 and with the main drain serving the primary processing station 2. There is, however, nothing to prevent the source 22 from being one and the same as the discharge station 25 for the heat exchange fluid circulating in the fluodynamic circuit 20. In this instance however, the supply source and discharge

station will consist in a basin of considerable capacity, either natural or artificial, affording an extensive free surface exposed directly to the atmosphere, in such a manner that the continuous discharge of fluid at high temperature will not affect the temperature of the fluid entering the feed pipeline.

The operation of the heat exchange device 19, described thus far essentially in structural terms, is as follows.

Fluid is drawn by the device 19 from the supply source 22, through the agency of the drive or pump means 20a, and directed via the feed pipeline 21 into the first heat exchange pipeline 23. Entering this first pipeline 23, the heat exchange fluid passes along the main flow line 27 and into the various branches 26, filling the respective heat exchangers 26a. During its passage through the heat exchangers 26a, the fluid will cool the respective machines and/or devices 4 and acquire heat in the process. The heated fluid thereupon passes through the secondary flow line 28 and into the second heat exchange pipeline 30 internally of which, and in conjunction with the relative heat exchangers 30a, it helps to maintain the temperature in the primary processing station 2 within predetermined values for carrying

out the humidifying and moisturizing treatments applied to the raw forming material. Finally the heat exchange fluid passes along the remaining length of the discharge pipeline 24 and into the discharge station 25.

The objects stated at the outset are realized by the present invention, and the drawbacks mentioned in the preamble duly overcome.

First and foremost, a system 1 for manufacturing tobacco products according to the present invention delivers production of optimum quality, and with no degradation of the forming material.

In addition, when equipped with the heat exchange device 19 described in the foregoing specification, the system 1 is able to cool the machines and/or devices 4 of the manufacturing station 3 without using complex and costly chilling equipment, and to heat the primary processing station 2, keeping the internal temperature at a constant value without the use of special heating equipment. Dispensing with chilling and heating equipment has the effect of lowering overall production costs significantly, and this in turn appreciably reduces the cost of marketing the finished products.